Benzo[b]fluoranthene (CASRN 205-99-2)

view QuickView

IRIS
List of IRIS Substances

Select a Substance go

Full IRIS Summary QuickView

MAIN CONTENTS

Reference Dose for Chronic Oral Exposure (RfD) go

0453

Benzo[b]fluoranthene; CASRN 205-99-2

Health assessment information on a chemical substance is included in IRIS only after a comprehensive review of chronic toxicity data by U.S. EPA health scientists from several Program Offices and the Office of Research and Development. The summaries presented in Sections I and II represent a consensus reached in the review process. Background information and explanations of the methods used to derive the values given in IRIS are provided in the Background Documents.

STATUS OF DATA FOR Benzo[b]fluoranthene

File First On-Line 12/01/1990

Category (section)	Status	Last Revised
Oral RfD Assessment (I.A.)	no data	
Inhalation RfC Assessment (I.B.)	no data	
Carcinogenicity Assessment (II.)	on-line	03/01/1994

_I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

_I.A. Reference Dose for Chronic Oral Exposure (RfD)

Substance Name -- Benzo[b]fluoranthene
CASRN -- 205-99-2

Not available at this time.

Back to top

_I.B. Reference Concentration for Chronic Inhalation Exposure (RfC)

183290

Substance Name -- Benzo[b]fluoranthene
CASRN -- 205-99-2

Not available at this time.

Back to top

_II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name -- Benzo[b]fluoranthene
CASRN -- 205-99-2
Last Revised -- 03/01/1994

Section II provides information on three aspects of the carcinogenic assessment for the substance in question; the weight-of-evidence judgment of the likelihood that the substance is a human carcinogen, and quantitative estimates of risk from oral exposure and from inhalation exposure. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. The rationale and methods used to develop the carcinogenicity information in IRIS are described in The Risk Assessment Guidelines of 1986 (EPA/600/8-87/045) and in the IRIS Background Document. IRIS summaries developed since the publication of EPA's more recent Proposed Guidelines for Carcinogen Risk Assessment also utilize those Guidelines where indicated (Federal Register 61(79):17960-18011, April 23, 1996). Users are referred to Section I of this IRIS file for information on long-term toxic effects other than carcinogenicity.

_II.A. Evidence for Human Carcinogenicity

__II.A.1. Weight-of-Evidence Characterization

Classification -- B2; probable human carcinogen

Basis -- Based on no human data and sufficient data from animal bioassays. Benzo [b]fluoranthene produced tumors in mice after lung implantation, intraperitoneal (i.p.) or subcutaneous (s.c.) injection, and skin painting.

__II.A.2. Human Carcinogenicity Data

None. Although there are no human data that specifically link exposure to benzo[b] fluoranthene to human cancers, benzo[b]fluoranthene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke (U.S. EPA, 1984, 1990; IARC, 1984).

__II.A.3. Animal Carcinogenicity Data

Sufficient. In a lifetime implant study, 3-month-old female Osborne- Mendel rats (35/group) received a single lung implant of either 0.1 mg (0.4 mg/kg), 0.3 mg (1.2 mg/kg) or 1 mg (4.1 mg/kg) benzo[b]fluoranthene in 0.05 mL of a 1:1 (v:v) mixture of beeswax and trioctanoin (Deutsch-Wenzel et al., 1983). Controls consisted of an untreated group and a group receiving an implant of the vehicle. The median survival times were: 118, 104, 110, 113 and 112 weeks, for the untreated, vehicle control,

Quantitative Estimate of Carcinogenic Risk from Oral Exposure

- Summary of Risk Estimates
- Dose-Response Data
- Additional Comments
- Discussion of Confidence

Quantitative Estimate of Carcinogenic Risk from Inhalation Exposure

- Summary of Risk Estimates
- Dose-Response Data
- Additional Comments
- Discussion of Confidence

EPA Documentation, Review and, Contacts

- Bibliography
- Revision History
- Synonyms

low-, mid- and high-dose groups, respectively. The incidences of epidermoid carcinomas and pleomorphic sarcomas in the lung and thorax (combined) were: untreated controls, 0/35; vehicle controls, 0/35; low-dose group, 1/35; mid-dose group, 3/35; and high- dose group, 13/35. These incidences showed a statistically significant dose- response relationship.

Groups of 15-17 male and 17-18 female CD-1 mice received i.p. injections of benzo [b]fluoranthene in DMSO on days 1, 8 and 15 after birth (total dose was approximately 126 ug/mouse) and were sacrificed at 52 weeks of age (LaVoie et al., 1987). A statistically significant increase in the incidence of liver adenomas and hepatomas (combined) occurred in treated males (8/15) relative to vehicle controls (1/17), but not in females. Lung adenomas (2/15 males, 3/17 females) were reported in treated animals, whereas none were found in controls.

Injection site sarcomas occurred in 18/24 survivors of a total of 16 male and 14 female XVIInc/Z mice that received three s.c. injections of benzo[b]fluoranthene (total dose = 2.6 mg) over a period of 2 months (Lacassagne et al., 1963).

Benzo[b]fluoranthene has yielded positive results for complete carcinogenic activity and initiating activity in mouse skin-painting assays. In skin-painting assays groups of 20 female Swiss mice were treated 3 times/week with 0.01, 0.1 or 0.5% solutions of benzo[b]fluoranthene in acetone (Wynder and Hoffmann, 1959). The high dose produced papillomas in 100% of the mice and carcinomas in 90% of the mice within 8 months. The middle dose produced papillomas in 65% and carcinomas in 85% within 12 months, while the low dose produced a papilloma in only 1 animal among 10 survivors at 14 months. No concurrent controls were observed. LaVoie et al. (1982) applied solutions of 0, 10, 30 or 100 ug benzo[b]fluoranthene in 0.1 mL acetone (10 doses, one every other day) to the skins of groups of 20 Crl:CD-1 mice. This regimen was followed by treatment with 2.5 ug 12-0-tetradecanoyl-phorbol-13-acetone (TPA) (a tumor promoter), 3 times/week for 20 weeks. Increases in the percentage of tumor-bearing animals (0, 45, 60, 80) as well as the number of skin tumors/animal (0, 0.9, 2.3, 7.1) appeared to be dose-related. Similar studies by Amin et al. (1985a,b) resulted in comparable elevations of tumor incidence.

__II.A.4. Supporting Data for Carcinogenicity

Positive results have been reported for a reverse mutation assay in Salmonella TA98 and the results for Salmonella TA100 have been positive and not positive (Mossanda et al., 1979; LaVoie et al., 1979; Hermann, 1981; Amin et al., 1985a,b).

Current theories on mechanisms of metabolic activation of polycyclic aromatic hydrocarbons are consistent with a carcinogenic potential for benzo[b]fluoranthene. Benzo[b]fluoranthene does not have a "classic bay- region" structure (Jerina et al., 1978). It is metabolized by mixed function oxidases to dihydrodiols (Amin et al., 1982). The 9,10-dihydrodiol is tumorigenic in mouse skin-painting assays, suggesting the possible formation of a reactive diol-epoxide (LaVoie et al., 1982).

Back to top

_II.B. Quantitative Estimate of Carcinogenic Risk from Oral Exposure

Not available.

Back to top

_II.C. Quantitative Estimate of Carcinogenic Risk from Inhalation Exposure

Not available.

Back to top

_II.D. EPA Documentation, Review, and Contacts (Carcinogenicity Assessment)

__II.D.1. EPA Documentation

Source Document -- U.S. EPA, 1984, 1990

The 1990 Drinking Water Criteria Document for Polycyclic Aromatic Hydrocarbons has received Agency and external review.

__II.D.2. EPA Review (Carcinogenicity Assessment)

Agency Work Group Review -- 02/07/1990, 08/05/1993, 09/21/1993, 02/02/1994

Verification Date -- 02/07/1990

__II.D.3. EPA Contacts (Carcinogenicity Assessment)

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or hotline.iris@epa.gov (internet address).

Back to top

_III. [reserved]
_IV. [reserved]
_V. [reserved]

_VI. Bibliography

Substance Name -- Benzo[b]fluoranthene
CASRN -- 205-99-2
Last Revised -- 12/01/1990

_VI.A. Oral RfD References

None

Back to top

_VI.B. Inhalation RfC References

None

Back to top

_VI.C. Carcinogenicity Assessment References

Amin, S., E.J. LaVoie and S.S. Hecht. 1982. Identification of metabolites of benzo[b] fluoranthene. Carcinogenesis. 3(2): 171-174.

Amin, S., K. Huie and S.S. Hecht. 1985a. Mutagenicity and tumor initiating activity of methylated benzo[b]fluoranthene. Carcinogenesis. 6(7): 1023- 1025.

Amin, S., N. Hussain, G. Balanikas, K. Huie and S.S. Hecht. 1985b. Mutagenicity and tumor initiating activity of methylated benzo[k]fluoranthenes. Cancer Lett. 26: 343-347.

Deutsch-Wenzel, R., H. Brune, G. Grimmer, G. Dettbarn and J. Misfeld. 1983. Experimental studies in rat lungs on the carcinogenicity and dose-response relationships of eight frequently occurring environmental polycyclic aromatic hydrocarbons. J. Natl. Cancer Inst. 71(3): 539-543.

Hermann, M. 1981. Synergistic effects of individual polycyclic aromatic hydrocarbons on the mutagenicity of their mixtures. Mutat. Res. 90: 399-409.

IARC (International Agency for Research on Cancer). 1984. Monographs on the Evaluation of the Carcinogenic Risk of the Chemical to Man. Polynuclear Aromatic Hydrocarbons. Part 3. Industrial Exposures in Aluminum Production, Coal Gasification, Coke Production, and Iron and Steel Founding. Vol. 34. World Health Organization.

Jerina, D.M., H. Yagi, R.E. Lehr, et al. 1978. The Bay-region theory of carcinogenisis by polycyclic aromatic hydrocarbons. In: Polycyclic Hydrocarbons and Cancer, Vol. 1. Environment, Chemistry and Metabolism, H.V. Gelboin and P.O.P. Ts'o, Ed. Academic Press, NY.

Lacassagne, A., N.P. Buu-Hoi, F. Zajdela, D. Lavit-Lamy and O. Chalvet. 1963. Activite cancerogene d'hydrocarbures aromatiques polycycliques a noyau fluoranthene. Un. Int. Cancer Acta. 19(3-4): 490-496. (Fre.)

LaVoie, E.J., E.V. Bedenko, N. Hirota, S.S. Hecht and D. Hoffmann. 1979. A comparison of the mutagenicity, tumor-initiating activity and complete carcinogenicity of polynuclear aromatic hydrocarbons. In: Polynuclear Aromatic Hydrocarbons, P.W. Jones and P. Leber, Ed. Ann Arbor Science Publishers, Ann Arbor, MI. p. 705-721.

LaVoie, E.J., S. Amin., S.S. Hecht, K. Furuya and D. Hoffmann. 1982. Tumor initiating activity of dihydrodiols of benzo[b]fluoranthene, benzo[j]fluoranthene and benzo[k]fluoranthene. Carcinogenesis. 3(1): 49-52.

LaVoie, E.J., J. Braley, J.E. Rice and A. Rivenson. 1987. Tumorigenic activity for non-alternant polynuclear aromatic hydrocarbons in newborn mice. Cancer Lett. 34:

15-20.

Mossanda, K., F. Poncelet, A. Fouassin and M. Mercier. 1979. Detection of mutagenic polycyclic aromatic hydrocarbons in African smoked fish. Food Cosmet. Toxicol. 17: 141-143.

U.S. EPA. 1984. Carcinogen Assessment of Coke Oven Emissions. Office of Health and Environmental Assessment, Washington, DC. EPA 600/6-82-003F. NTIS PB 84-170181.

U.S. EPA. 1990. Drinking Water Criteria Document for Polycyclic Aromatic Hydrocarbons (PAHs). Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. Final Draft. ECAO-CIN-D010, September, 1990.

Wynder, E.L. and D. Hoffmann. 1959. A study of tobacco carcinogenesis. VII. The role of higher polycyclic hydrocarbons. Cancer. 12: 1079-1086.

Back to top

_VII. Revision History

Substance Name -- Benzo[b]fluoranthene
CASRN -- 205-99-2

Date	Section	Description
12/01/1990	II.	Carcinogen assessment on-line
12/01/1990	VI.	Bibliography on-line
01/01/1992	IV.	Regulatory Action section on-line
09/01/1993	II.	Carcinogenicity assessment noted as pending change
09/01/1993	II.D.2.	Work group review date added
11/01/1993	II.D.2.	Work group review date added
03/01/1994	II.	Pending change note removed; no change
03/01/1994	II.D.2.	Work group review date added
08/01/1995	II.D.2.	EPA's RfD/RfC and CRAVE workgroups were discontinued in May, 1995. Chemical substance reviews that were not completed by September 1995 were taken out of IRIS review. The IRIS Pilot Program replaced the workgroup functions beginning in September, 1995.
04/01/1997	III., IV., V.	Drinking Water Health Advisories, EPA Regulatory Actions, and Supplementary Data were removed from IRIS on or before April 1997. IRIS users were directed to the appropriate EPA Program Offices for this information.

Back to top

_VIII. Synonyms

Substance Name -- Benzo[b]fluoranthene
CASRN -- 205-99-2
Last Revised -- 12/01/1990

205-99-2
Benz(e)acephenanthrylene
B(b)F
BENZ(e)ACEPHENANTHRYLENE
Benzo(b)fluoranthene
Benzo(e)fluoranthene
HSDB 4035
NSC 89265
2,3-BENZFLUORANTHENE
2,3-BENZOFLUORANTHENE
2,3-BENZOFLUORANTHRENE
3,4-BENZ(e)ACEPHENANTHRYLENE
3,4-BENZFLUORANTHENE
3,4-Benzofluoranthene

Back to top

Recent Additions | Search IRIS | IRIS Home | NCEA Home | ORD Home

EPA Home | Privacy and Security Notice | Contact Us

Last updated on Thursday, November 18th, 2004
URL: http://www.epa.gov/iris/subst/0453.htm